NWS Seattle 2020 Fire Weather Annual Summary

By: Steve Reedy, Carly Kovacik and Madelyn Kristell, Fire Weather Program Leaders

This report summarizes NWS Seattle's Fire Weather products and services in support of Western Washington land management agencies and public safety partners in the 2020 calendar year. This report addresses verification of Red Flag Warnings; Spot Forecast statistics; IMET dispatch information; and detailed information on fire weather training, liaison, and outreach activities.

2020 Weather Synopsis

Leading into the Spring of 2020, mountain snowpack was above normal and Western Washington was drought free. Below normal temperatures then dominated most of the month of March, with a wetter pattern setting up towards the end of the month. These conditions helped preserve the snowpack over the mountains and prevent drought conditions from developing. By the end of the April, temperatures were generally near normal, but with significantly less precipitation, snowpack began melting out and abnormally dry conditions developed along the Coast and towards Southern Puget Sound and the Southern Cascades. The Climate Prediction Center issued the 3 month outlook including the months of May, June, and July, encompassing the beginning of the Western Washington fire weather season, where the forecast called for increased chances for above normal temperatures and below normal precipitation. Given the below normal precipitation in April, along with the predicted warm and dry start to summer, there was concern that Western Washington may see an active start to Fire Weather Season. This did not prove to be the case, as the month of May finished with above normal precipitation, despite warmer than normal conditions. Given the wet month, the abnormally dry conditions were largely confined to the south of the forecast area. The Climate Prediction Center then issued the 3 month outlook that included the heart of fire weather season, which continued to call for warmer than normal conditions and drier than normal conditions. Thus, there remained concern that Western Washington could still face an active fire weather season. Near normal temperatures and above normal precipitation continued through June, with Western Washington largely under the influence of onshore flow.

At the beginning of fire season in July, temperatures were below normal and remained below seasonal values through the middle of the month. These conditions were accompanied by onshore flow as a trough lingered in the vicinity of the region. The second half of the month was then characterized by warmer than normal temperatures as a ridge of high pressure became the main feature of influence. The extended period of onshore flow and cooler temperatures the first half of the month kept dangerous fire weather conditions at bay, despite generally below normal precipitation. As fire weather season continued through August, the area experienced above normal conditions and below normal precipitation. Despite these favorable fire weather conditions, outbreaks of wildfires were largely suppressed. This would change noticeably in September, with dry fuels and continued dry conditions setting the stage for numerous fire starts during an east wind event in early September. The details of the September fire event can be referenced in the SEW AAR archive: https://sites.google.com/a/noaa.gov/nws-wr-sew-

new/home/operations/event-reporting-surveys-reviews/after-action-reviews-aars/sept-2020-fires-smoke

An atmospheric river event would help bring an early end to fire season across western Washington towards the end of September. The active weather would continue into October, with unfavorable fire weather conditions continuing.

2020 Fire Weather Watch / Red Flag Warning Verification

Red Flag events consist of **1)** scattered lightning, **2)** a combination of a moderate breeze and low relative humidity, or **3)** a dry and unstable atmosphere – in combination with dry fuels. When fuels have reached a pre-requisite level of dryness, Red Flag events are determined using lightning data, surface observations (mainly RAWS and ASOS sites), and upper air data. Impacts - such as growth on existing fires and new ignitions - are strongly considered.

A lack of lightning events proved to help WFO Seattle skill scores in 2020, going from 0.20 in 2019 to 0.68 in 2020. This lack of lightning would also help the False Alarm Rate, improving from 50% in 2019 to 30% in 2020. Of course, one lightning event would occur as fuels transitioned from moist to dry late in July that would prove to be the WFO's only missed event. An easily forecast East Wind/Dry and Unstable event at the start of September would help to significantly raise the average lead time statistic for the 2020 season, nearly doubling from 22 hours in 2019 to 41 hours in 2020.

JULY 27, 2020 - Dry and Unstable
Zone 659 (Central Cascades above 1500 feet):
RFW issued for dry and unstable conditions. All stations within zone 659 met criteria making for easy verification. *Warning verified with 5.5 hours of lead time from the issuance of the Red Flag Warning*

JULY 31, 2020 - Lightning
Zone 659 (Central Cascades above 1500 feet):
Early morning lightning event developed over Zone 659, dropping 20 strikes within the zone. No RFW issued. *Missed Event.*

AUGUST 15-16, 2019 – Dry and Unstable
Zones 655 (Black Hills & SW Interior Lowlands), 657(SE Puget Sound Lowlands below 1500 feet), 658 (North Cascades above 1500 feet) & 659 (Central Cascades above 1500 feet):
RFW issued for Dry and Unstable conditions. Results would be mixed as only Zones 658 and 659 would meet criteria on the 15th, while all warned zones except for 657 would meet criteria on the 16th. *For the 15th, lead time was approximately 33 hours from the issuance of the Fire Weather Watch, 21 hours from the upgrade to a Red Flag Warning. For the 16th, lead time was approximately 56 hours from the issuance of the Fire Weather Watch and 44 hours from the upgrade to a Red Flag Warning.*

SEPTEMBER 7-10, 2020 - Wind and RH (7-8), Dry and Unstable (9-10)
Zones 651 (Central Coastal Lowlands), 655 (Black Hills & SW Interior Lowlands), 656 (Northeast Puget Sound Lowlands below 1500 feet), 657 (SE Puget Sound Lowlands below 1500 feet), 658 (North Cascades above 1500 feet), 659 (Central Cascades above 1500 feet) & 661 (East Portion of the Olympic Mountains):
An east wind event set up over Western Washington for the first two days of this event (7th and 8th) and while winds would ease, dry and unstable conditions would remain over the area for the second half of the event (9th and 10th). Several wildfires would either start or grow rapidly during this event, including the Sumner Grade Fire which would result in evacuations from the communities of Sumner and Bonney Lake. *Zones 651, 655, 656 and 657 would verify on the 7th, Zones 651, 655, 657, 659 on the 8th, Zones 651, 655, 657, 658, 659 and 661 on the 9th and finally Zones 655, 657, 658, 659, 661 on the 10th. Lead times for each zone are as follows: 67 hours from the issuance of the Fire Weather Watch, 31 hours from the upgrade to a Red Flag Warning for Zones 651 and 655, 66 hours from the issuance of the Fire Weather Watch, 30 hours from the upgrade to a Red Flag Warning for Zone 656, 74 hours from the issuance of the Fire Weather Watch, 38 hours from the upgrade to a Red Flag Warning for Zone 657,75 hours from the issuance of the Fire Weather Watch, 39 hours*

from the upgrade to a Red Flag Warning for Zone 659, 116 hours from the issuance of the Fire Weather Watch, 80 hours from the upgrade to a Red Flag Warning for Zone 658 and lastly, 113 hours from the issuance of the Fire Weather Watch, 77 hours from the upgrade to a Red Flag Warning for Zone 661.

2020 Stats

Red Flag Warnings	- 37 issued - 26 verified - 1 unwarned events
Average lead-time of Red Flag events	- 41 hours
# Of Red Flag Warnings issued = a + c	= 37
# Of Red Flag Warnings that verified = a	= 26
# Of Red Flag Warnings that did not verify = c	= 11
# Of observed events with no RFW issued = b	= 1

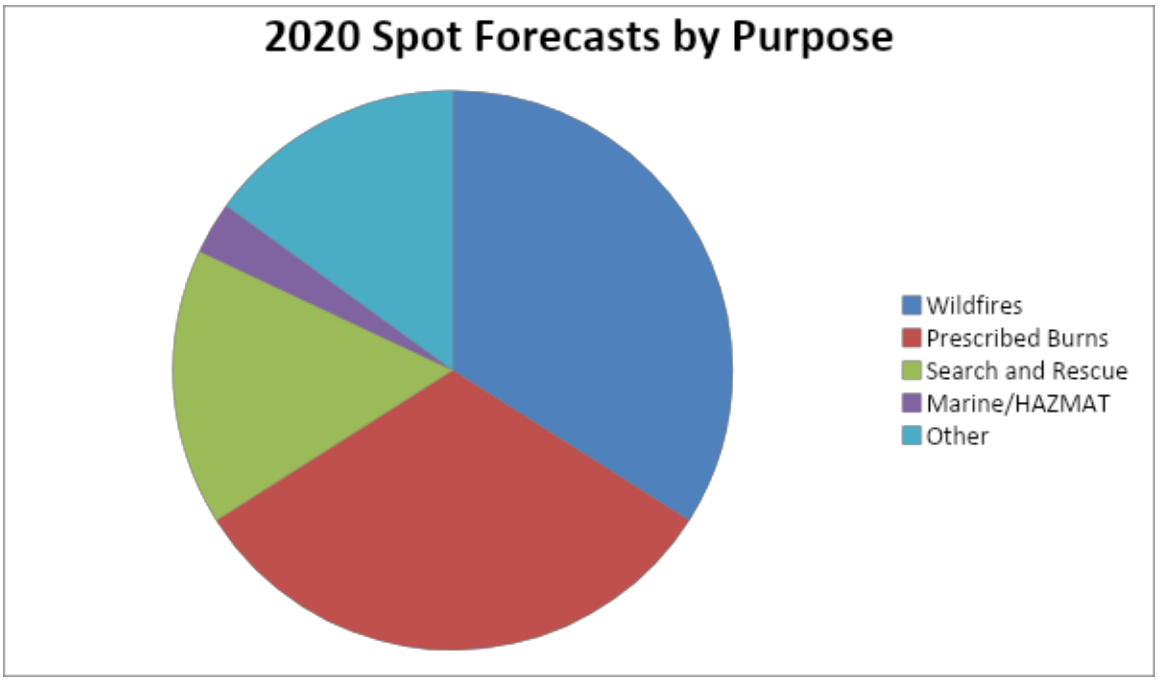
Probability of Detection (POD)	= a/(a+b)	= 26 / (26+1)	= 0.96 = 96%
False Alarm Rate (FAR)	= 1 - (a/(a+c))	= 1 – (26 / (26+11)	= 0.30 = 30%
Critical Success Index (CSI)	= a/(a+b+c)	= 26 / (26+11+1)	= **0.68**

2020 Spot Forecasts

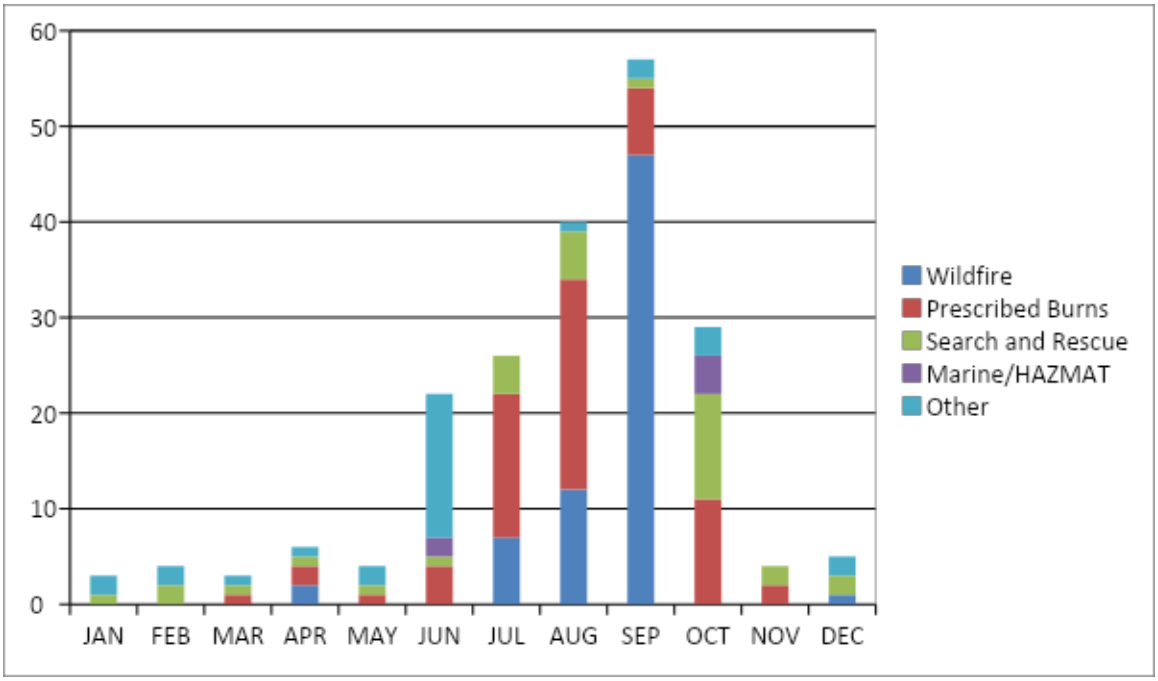
Spot Forecasts are intended to support tactical decision making on wildland fires, prescribed burns, Search and Rescue missions, HAZMAT incidents and public events.

NWS Seattle issued 203 Spot Forecasts in 2020. This was a slight increase from the 185 forecasts issued in 2019. Numbers for wildfire spots saw a significant increase, going from 21 in 2019 to 69 last year, mainly due to the prolonged Red Flag event in early September and all the starts associated with that. Prescribed burn spots however took a significant hit, going from 101 in 2019 to 65 in 2020. This is likely due to the very low number of prescribed events during the first half of the year as agencies responsible for these burns were likely trying to figure out how to conduct these activities safely during the COVID-19 pandemic. The 'Other' category saw a slight increase mainly for two reasons: initial forecasts for COVID-19 testing and treatment centers until a more regular briefing product could be established and in June due to law enforcement needing support during numerous protests and demonstrations in the area.

Purpose	# of Spots
Wildfire	69
Prescribed Burns	65
Search and Rescue	32
Marine/HAZMAT	6
Other	31



Breakdown of 2020 Spots Forecasts by Month



2020 IMET Dispatches

In 2020, NWS Seattle **I**ncident **Met**eorologist (**IMET**) responded to **3 dispatches** totaling **29 days** of on-site weather support, including travel. They were:

Dates	IMET	Location	Incident
8/21 – 9/2	Bower	Meachem, OR	Meachem Fire Complex
9/10 – 9/13	Bower	Willits, CA	Oak Fire
9/14 – 9/25	Bower	Elk Creek, CA	August Complex

Training, Liaison, and Outreach Activities in 2020

The COVID-19 pandemic did not allow for any outreach activities this year. To maintain ties with our partners and aid in preparing them for the 2020 season, bi-weekly YouTube seasonal outlook videos were produced in lieu of making such presentations at various refreshers. S-190 and S-290 classes still remained a priority but were handled virtually via tools such as Skype and Google Meetings.

Date	Forecaster	Location	Activity
06/08-09/20	Reedy	Virtual	S-290